

Thysanoptera from papyrus in the Sudan.

by

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Last year Dr. W. J. Hall, Director of the Commonwealth Institute of Entomology, kindly sent me some thrips collected on papyrus in the Sudan by Dr. I. W. B. Thornton, Lecturer in Zoology, University College of Khartoum. I am greatly indebted to Drs. Hall and Thornton for allowing me to study this interesting material.

In addition to the specimens dealt with below, the collection contained many larvae, which I have not been able to study in detail. Four very interesting uniques were also included, which I am retaining for later study, in the hope that additional specimens will be collected.

Suborder TEREBRANTIA

Family THIRIPIDAE

Catina gen. nov.

Body elongate, cylindrical, weakly sculptured, without a vestiture of microsetulae. Head 0.8 - 1.0 as long as wide, and 0.7 - 0.8 as long as the pronotum, widest across the prominently bulging eyes; cheeks gently rounded; head scarcely produced in front of eyes. Eyes large, prominent, 0.6 - 0.7 as long as the head, coarsely and closely faceted, their dorsal and ventral lengths subequal, dorsal interval subequal to dorsal width of each eye. Ocelli well developed; a transverse line drawn midway between anterior and posterior ocelli passes through the middle of each eye, the ocelli not on a hump, the anterior one situated in a slight depression. Head setae moderately prominent, the interocellars situated between the anterior and posterior ocelli, but within the triangle.

Antennae eight segmented, with style of two segments, third and fourth segments bearing forked sense-cones that are prominently curved dorso-ventrally, first and fourth segments of both sexes normal, not enlarged or asymmetrical. Mouth-cone short, broadly rounded at apex, its length from posterior dorsal margin of head about 0.8 of the head length; maxillary palpi three-segmented.

Pronotum slightly longer than head, and about as long as its own width, the sides subparallel, without prominent bristles, those at posterior angles short and inconspicuous, only about 0.2 as long as pronotum.

Fore-wings similar to those of *Exothrips* Priesner and *Perissothrips* Hood, narrow, apex pointed but not dendrothripoid; costa and the two longitudinal veins present but not very prominent; about 20 costal setae, longer than those on other veins; anterior vein with about 7 setae in basal half and 3 widely spaced setae in distal half; posterior vein with about 4 setae; wing surface with the usual dense covering of microsetulae; fringes present on both margins of both pairs of wings.

Legs normal, without any special characters, fore femora only slightly incrassate in both sexes.

Abdominal tergites ii-viii in both sexes, as well as sternites ii-vii in ♀♀ and ii-viii in ♂♂, with prominent sclerotized posterior marginal extensions (m on fig. 3) which are particularly well developed in the ♀♀, about half as long as their sternites on segments iii and iv, and divided into broad scale-like scallops whose posterior margins are feebly notched; in the males these extensions bear minute teeth at the sides on tergites iv-viii. Apex of abdomen rather sharply pointed in female, segment x split above (this not shown on fig 5) in both sexes, ovipositor long and strongly developed; tergite ix in ♂♂ with a pair of short, thick, peg-like median spines.

Typus generis: *Catina papyri* spec. nov.

This genus is closely related to *Exothrips* Priesner; the female of *papyri* could be placed in *Exothrips* without any hesitation; but the male cannot be placed there because its antenna is normal, without the greatly enlarged first and asymmetrical fourth segments, which were regarded by Priesner as the important generic characters of *Exothrips*; the male of *Catina* also lacks teeth on the fore tibiae. The teeth on the abdominal tergites of the ♂♂ and the setae at posterior angles of pronotum in the new genus are similar to those of *Perissothrips* Hood, but this has a small head, large prothorax and very long mouth-cone. From *Oxythrips* Uzel the new genus differs in having short and inconspicuous postero-angular setae on the pronotum and only a few setae on the posterior vein of the fore-wing.

Catina papyri spec. nov. (Figs. 1-5)

Male (macropterous). Length (distended) about 1.0 mm. *Colour* of body and appendages yellow, with the following exceptions: mesothorax lightly tinged with pale grey at sides only; eyes so deep red as to appear black; ocellar crescents bright red; testes orange; antennae: i colourless, ii very feintly greyish, iii-viii yellow; fore-wings pale grey in about basal third, thence fading very gradually towards apex, about one-third of wing at apex very feintly grey, almost colourless; there is a small irregular transparent spot in the middle of the fore-wing, just distad of the basal group of 4 setae on the anterior vein; hind wings with median grey line; wing setae and fringes of both wings pale grey, body setae paler, almost colourless; tarsal cups and tip of mouth-cone light brown.

Sculpturing: head behind eyes with about 5 transverse lines, feintly rugose at sides of anterior ocellus and in front of it; whole of area between eyes on ventral aspect with rather prominent transverse lines; pronotum and mesonotum with feint anastomosing transverse lines; median part of metanotum with more prominent longitudinal lines; abdominal tergites i - ix with anastomosing lines that are more prominent at the sides, sternites ii - viii with more distinct lines, which bear minute spine-like asperities on vi - viii, there being 3 such asperate lines on sternite viii; all femora and tibiae and antennals i and ii also bear transverse lines.

Head: its dorsal setae as illustrated (fig. 1); ventrally there are only two pairs of minute setae on the area between the eyes, one pair near antennae, the other near base of labrum, and about 6 pairs of minute setae behind eyes. Antennae as illustrated (fig. 2); the lines of sculpturing omitted from segments i and ii on the figure.

Pronotum bears scattered setae on the disc (fig. 1); counting from the median line, it is the seventh pair of setae on the hind margin that are moderately enlarged. Mesonotum bears three pairs of setae about like those on disc of pronotum, one at lateral extremities and two pairs near hind margin. Metanotum has two similar pairs near anterior margin.

Wings: fore-wing setae fairly constant in number: on costa 18 to 22 setae, about 19—21 μ long at base, and 30—34 μ at apex, where they are easily confused with the fringe hairs; on anterior vein 4 (rarely 5) at base, then a group of 3 (rarely 2), and 3 widely scattered ones in distal half; hind vein with 4 (rarely 3) setae, widely separated, the apical one about 60 μ from apex of wing; scale bears 5 setae at the suture; fringes borne on distal two-thirds only of both pairs of wings.

Abdomen: the teeth on tergites iv - viii are only about 4 μ in length, irregular in shape, usually sharply pointed, sometimes bifid, but in some cases blunt; there are 5 - 7 on each side of iv - vii, but on viii they are blunt and

Explanation of figures.

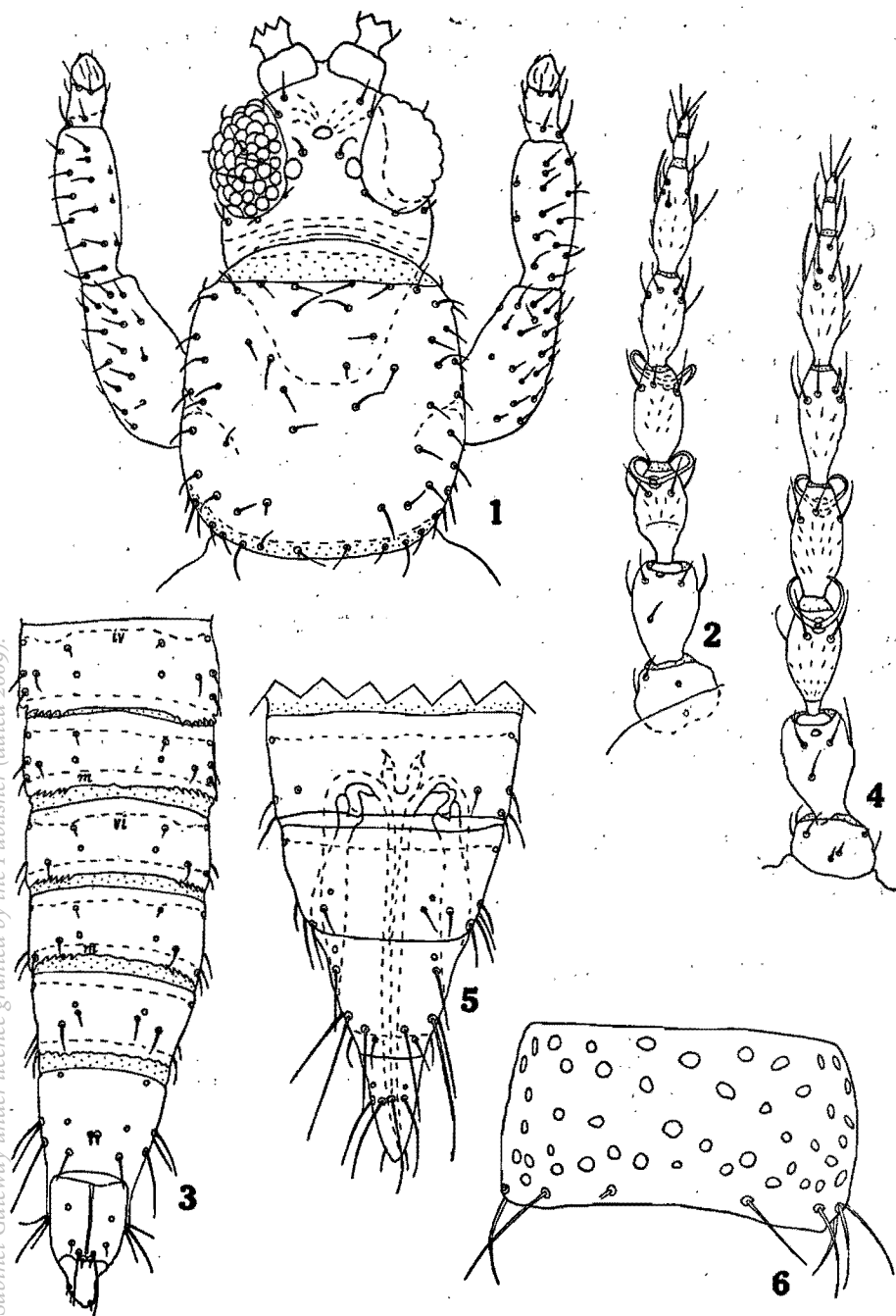
Catina papyri gen. et spec. nov.

- Fig. 1—♂, paratype, head and prothorax
- 2—♂, paratype, right antenna
- 3—♂, holotype, tergites iv - x of adomen;
m — sclerotized marginal extension
- 4—♀, paratype, right antenna
(Figs. 2 and 4 drawn to same scale)
- 5—♀, paratype tergites vii - x of abdomen
(longitudinal suture on x not shown):

Trichomothrips bellus Priesner

- Fig. 6—♂, sternite viii of abdomen.

Figs. 1—6: Mrs M. Meyer del. (Projection apparatus).



poorly developed; these teeth are seen with difficulty in males that have not been treated with NaOH, and they are absent in some cases. The examination of 47 ♂♂ treated with NaOH and mounted in Canada balsam gave the following figures: 37, or 79 % have well-developed teeth more or less like those on fig. 3; 6, or about 13 % have poorly-developed teeth; and 4, or about 8 % have no teeth.

Setae on abdomen as illustrated (fig. 3). The longest postero-angulars on tergites ii-viii are about 17-21 μ long; on ix the longest pair, situated latero-ventrally, measures about 50 μ , and the dorso-median pair of sharp peg-like spines are about 6 μ long. Tergite x is split throughout its length on the mid-dorsal line. The sternites bear no glandular areas and they also lack accessory setae; their postero-marginals are 17-19 μ long, there are 2 pairs on ii, and 3 pairs on iii-viii.

Measurements of holotype (macropterous ♂, NaOH-treated, taken on papyrus at Jonglei, Sudd Region, Sudan in June 1954 by Dr. I. W. B. Thornton) in μ , followed in parentheses by the ranges of this plus three ♂♂ paratypes (one of these NaOH-treated) from Rejaf and Bor in the Sudd, and from Napoleon Gulf, Lake Victoria, Uganda: Length 1015 (1000-1031); head L. 89 (-110), W. across eyes 114 (110-), W. across cheeks 101 (97-106), W. at base 89 (-97); eyes: dorsal L. 55 (-64), ventral L. 53 (51-59), dorsal W. 34-38 (34-38), interval 42 (38-47), ventral W. 25-27 (23-), interval 61 (59-64); ocelli: anterior to posterior 15 (13-17), interval of posterior 21 (19-23), longitudinal/transverse diameter, anterior 6/11 (9-), posterior 9 (-11)/9; head setae: ante-ocellars 13 (9-15), inter-ocellars 13 (-19); mouth-cone L. from posterior dorsal margin of head 72 (72), palpi L./W. maxillary segment i: 11 (9-)/4(-5), ii: 9(4-)/3(-4), iii: 11(9-)/2(2); labial 11(9-)/2(2); pronotum L. 127 (125-131), W. 134 (122-136), its postero-angular setae: outer 21(17-), inner 13(11-17); mesothorax W. 162(148-169); metathorax W. 148(134-155); fore-wing L. 492 (477-539), W. across scale 55(51-59), W. at middle 25(-30), W. 60 μ from apex 21 (-25), fringe L. anterior 120 (106-), posterior 261 (247-292); legs: L./W. (throughout the writer's papers L. of femur includes L. of trochanter) ff. 106(99-)/38(35-42), ft. 72(71-78)/30 (28-), fta. 38 (-42)/17(14-), hf. 113(106-120)/30(-31), ht. 93(92-106)/25(-28), hta. 42(-49)/15(14-); abdomen L. 585(-631), W. 134(122-141).

Antennae: total L. 212(205-).

Segm.	L.	W.	Segm.	L.	W.
i	21(21)	30(27-);	v	30(-32),	15(15).
ii	27(-30)	21(21) ;	vi	36(-38),	13(13).
iii	34(30-)	17(17) ;	vii	9(6-)	4(4).
iv	32(30-34),	17(17) ;	viii	9(9)	4(4).

Female (macropterous). Length (distended) about 1.2-1.3 mm. *Colour* and structure very similar to those of the male, with the following exceptions: the antennae are darker, i very pale yellow, almost colourless, ii pale grey,

iii yellow, iv greyish yellow, darker than ii and about as dark as ii, v pale grey like ii but slightly darker apically, vi brownish grey, paler in basal fifth, vii brownish grey, viii grey, slightly paler than vii; fore-wings slightly darker than those of male, with a brownish tinge on the grey parts.

Measurements of allotype (macropterous ♀, NaOH-treated, taken on papyrus at Rejaf in the Sudd, Sudan, in January 1955 by Dr. I. W. B. Thornton) in μ , followed in parentheses by the ranges of this plus three ♀♀, paratypes (two of these NaOH-treated), from Rejaf and Jonglei in the Sudd and from Lake Victoria in Uganda: Length 1320 (1200—); head L. 106(92—110), W. across eyes 125(116—), W. across cheeks 112(106—), W. at base 97(95—99); eyes: dorsal L. 64(59—70), ventral L. 59(51—64), dorsal W. 38(34—40), interval 49(40—), ventral W. 30(23—), interval 65(59—68); ocelli: anterior to posterior 17(13—), interval of posterior 23(21—), longitudinal/transverse diameter, anterior 9(6—)/11(9—), posterior 9(—13)/9(9); head setae: anteo-cellars 11(9—17), inter-o-cellars 21(13—); mouth-cone, L. from posterior dorsal margin of head 71(55—76), palpi L./W. maxillary segment i: 11(9—13)/4(—6), ii: 6(—8)/3(—4), iii: 9(—11)/2(—3); labial ?(9—13)/?(2—3); pronotum L. 136(131—144), W. 148(136—), its postero-angular setae: outer 21(—23), inner 17(13—); mesothorax W. 190(172—); metathorax W. 179(165—); fore-wing L. 585(554—615), W. across scale 72(59—), W. at middle 34(30—), W. 60 μ from apex 30(25—), fringe L. anterior 134(127—), posterior 331(303—346); legs: L./W. ff. 85(—99)/49(45—), ft. 85(78—)/35(31—), fta. 49(45—)/17(14—), hf. 120(113—127)/38(35—), ht. 113(106—)/31(28—), hta. 49(42—51)/21(17—); abdomen L. 862(785—), W. 212(190—), ovipositor L. 254(236—).

Antennae total L. 233(219—239).

Segm.	L.	W.	Segm.	L.	W.
i	21(17—),	30(25—);	v	34(—36),	17(15—).
ii	34(30—),	23(23);	vi	42(42)	, 15(13—).
iii	34(—36),	19(17—);	vii	9(9)	, 4(—5).
iv	36(—38),	17(17);	viii	11(10—),	4(4).

Material studied: 88 ♂♂ and 124 ♀♀ mounted on slides, collected by Dr. I. W. B. Thornton on papyrus as follows: Uganda: Napoleon Gulf, Lake Victoria, May 1954, 5 ♂♂, 3 ♀♀; Sudan: Sudd Region: Bor, June 1954, 11 ♂♂, 14 ♀♀; Jonglei, June 1954, 6 ♂♂, 6 ♀♀; Rejaf, January 1955, 66 ♂♂, 101 ♀♀.

This new species differs from all the known species of *Exothrips* Priesner, of which the males are known, in having the antennae of the male normal in structure, like those of the female. From *Exothrips tenellus* Priesner 1950, of which only the female is known, it differs as follows: *C. papyri* has the tip of the abdomen not darkened, the fore-wings brownish grey, segments v - viii of the antennae largely grey, five setae at suture on scale of fore-wing, and the width of the fore femora only 45—49 μ instead of 70 μ .

***Trichromothrips bellus* Priesner (Fig. 6).**

1930 Bull. Soc. roy. ent. d'Egypte, pp. 9-11, figs. 4-6.

Dr. Thornton collected a small series of this beautiful species on papyrus in the Sudd region of the Sudan. It was first recorded from turf in Egypt, and Dr. Priesner has kindly sent me a male and a female taken on *Cyperus* sp. at Wad Medani in the Sudan by W. P. L. Cameron in 1931. I collected one female at Moorddrift near Potgietersrust in the Transvaal on 20.iv.1924, and 6 ♀♀ at the Victoria Falls in Rhodesia in July 1939. The species will therefore probably be found to be widely distributed in Africa.

The specimens from papyrus in the Sudan and from Southern Africa agree well with the original description and the specimens identified by Dr. Priesner. There are differences in the measurements, but I regard these as individual variations.

In the description of the genus the maxillary palpi are said to be two-segmented, but they are three-segmented. On two females from the Sudan, NaOH-treated and mounted ventral side upward, the palpi were measured: maxillary, segment i L./W. 8/6, ii: 6-8/4-5, iii: 8/4 μ labial palpi 5/3 μ .

On the anterior vein of the fore-wing a few wings have six basal setae, and some wings have an additional median seta between the basal group and the two at apex; hind vein with 9-13 setae; the scale bears 4 (occasionally 3) setae at the suture and one (rarely 2) on the disc near its base.

Measurements of one female (Jonglei, Sudd, Sudan, June 1954, Dr. I. W. B. Thornton) in μ , followed in parentheses by the ranges of this plus three other females (one NaOH-treated; Jonglei, Sudan, one Victoria Falls, Rhodesia, and one from Moorddrift, Transvaal): Length (more or less distended) 1320 (-1380); head L. 148(120-), W. across eyes 136(129-), least W. near eyes 123(110-), W. at base 136(119-); eyes dorsal L. 82(76-), dorsal W. ?(38-40), interval ?(51-55), ventral W. ?(37), interval ?(55); ocelli: anterior-posterior 17(13-), interval of posterior pair 23(21-25), diameters longit./transv. anterior 13(9-)/17(15-21), posterior 17(15-)/13(11-), head setae interocellars 42-47(38-), post-ocellars 34(21-), post-oculars 17(17); ventral head setae (measured on one ♀ only) pair near antennae 42, interval 13, pair 21 μ from labrum 38, interval 21; mouth-cone L. from posterior dorsal margin of head 71(-110); pronotum L. 120(114-127), W. 190(169-), its postero-angular setae, outer 38(-42), inner 51(-64); mesothorax W. 254(233-261), metathorax W. 257(226-); fore-wings L. 708(677-800), W. across scale 89(76-), W. at middle 42(38-), W. 60 μ from apex 38(34-), fringe L. anterior 141(113-148), posterior 353(338-388), longest costal setae 53(47-59), longest posterior vein setae 44(42-51); abdomen L. 815(739-877), W. 303(254-); ovipositor L. 219(-261); tergite ix setae at posterior margin, counting only large setae, S.1: 85(72-), S.2: 152(123-), S.3: 148(127-), lateral seta near middle of tergite 68(51-72); tergite x: S.1: 114(-123), S.2: 114(106-).

Antennae total L. 313(—370).

Segm.	L.	W.	Segm.	L.	W.
i	30(23—),	32(—34);	v	40(—51),	17(15—).
ii	34(—44),	25(—27);	vi	59(—72),	17(13—).
iii	47(—59),	21(19—);	vii	13(—15),	6(6)
iv	55(—68),	19(19)	viii	21(—27),	4(4)

Male (macropterous). Priesner described a brachypterous male; one male from papyrus in the Sudan is macropterous.

The sternites are provided with a large number of irregular dot-like glandular areas, similar to those figured by Pelikan for *Taeniothrips dianthi* Priesner (Ent. Listy xiv, 1951 p. 13 figs. 5—8) and described by Priesner in *Taeniothrips cameroni* Priesner (Bull. Soc. roy. ent. d'Egypte 1934 p. 29). In a male identified by Dr. Priesner, from Wad Medani, Sudan, and one taken by Dr. Thornton in the Sudd, I find the gland-openings arranged in two or three irregular rows on sternites ii—iv, and in four irregular rows on v—viii; the number of openings is, approximately: ii: 9—18; iii: 15—42; iv: 23—42; v: 30—38; vi: 33—52; vii 45—48; viii: 30—45.

Measurements of macropterous male (Jonglei, Sudd, Sudan, June 1954 Dr. I. W. B. Thornton) in μ : Length (distended) 1000; head L. 106, W. across eyes 110, least W. near eyes 93, W. at base 101; eyes: dorsal L. 59, ventral L. 49, dorsal W. 34, interval 42, ventral W. 29—30, interval 51; ocelli: anterior-posterior 9, interval posterior pair 21, diameters longit./transv. anterior 9/15, posterior 13/9; head setae: interocellar 34, post-ocellar 21, post-ocular 17, ventral anterior pair near antennae 34, interval 13, posterior pair 17—21 from labrum 30, interval 13; mouth-cone L. from posterior dorsal margin of head 76; palpi L./W. maxillary segment i: 11/6, ii: 5/4, iii: 8/3; pronotum L. 93, W. 134, postero-angular setae outer 36, inner 38; mesothorax W. 176, metathorax W. 169; fore-wing L. 508, W. across scale 64, stet at middle 34, W. 60 μ from apex 34, fringe L. anterior 106, posterior 247; longest seta on costa 38, on posterior vein 34; legs L./W. ff. 99/34, ft. 85/30, fta. 56/17; hf. 120/30, ht. 120/27, its apical spurs 21, hta. 56/17; abdomen L. 615, W. 162; tergite ix L. at middle 42, at sides 68; counting all setae on caudal margin of tergite ix: S.1: 25, S.2: 51, S.3: 17, S.4: 68.

Antennae total L. 257—261.

Segm.	i	ii	iii	iv	v	vi	vii	viii
L.	21	30	34	38	38	51	11	17
W.	25	21	15	17	13	13	6	4

Material studied: 23 ♀♀ and one ♂: Sudan, Jonglei, Sudd Region, June 1954, on papyrus, Dr. I. W. B. Thornton, 16 ♀♀, 1 ♂; Rhodesia, Victoria Falls, July 1939, collected by the writer on *Cyperus* sp. 6 ♀♀; Transvaal, Moorddrift, near Potgietersrust, 20-iv-1924 on *Grewia cana* Sond., collected by the writer, 1 ♀.

Dorcadothrips caespitis Priesner.

1932 Bull. Soc. roy. ent. d'Egypte pp. 49-51, figs. 1-2.

This interesting form was recorded by Priesner from turf grasses in Egypt. Dr. Thornton collected 16 ♀♀ and 3 ♂♂ on papyrus, as follows: Sudan: Jonglei in the Sudd Region, June 1954, 14 ♀♀; Rejaf, January 1955, 1 ♀, 1 ♂; Zeraf Cuts, January 1955, 1 ♀; Uganda: Lake Victoria, Bugangu, May 1954, 2 ♂♂.

The Sudan material agrees fairly closely with Priesner's description; I regard the differences in dimensions as individual variations. The following notes may be of interest.

I have counted the setae on 26 fore-wings of 14 females with the following results: the scale has 4 (rarely 5) at suture and one on disc near base; on the fore-vein, in the basal group, two wings have 7, twenty have 6, three have 5 and one has only 4 setae; in the middle of fore-vein eleven wings show one seta, fifteen have none; near apex on fore-vein there are 2 setae on all 26 wings; hind vein: five wings have 9, nine have 10, six have 11, four have 12 and two have 13 setae.

On page 51 Priesner states "prothorax hind angles with 1 pair of long bristles each" but on page 49 "two pairs". The former statement must be a misprint, since there are two pairs on all my specimens of both sexes.

The maxillary palpi are three-segmented in most of the specimens before me, including one ♀ kindly sent to me some years ago by Dr. Priesner; but the suture separating the second and third segment is not very distinct in all cases, and some of the palpi appear to be two-segmented.

Accessory sternite setae were not mentioned by Priesner; they are present in variable numbers and arrangement in both sexes; on sternites iii-viii there are 4 to 12 setae on the disc (accessories) in ♀♀ and 2 to 6 setae in ♂♂; both sexes have 3 pairs of setae on the caudal margin of these sternites.

The males bear prominent, more or less kidney-shaped glandular areas on sternites iii-vii; these are about 42-49 μ wide (measured transversely) and about 13-17 μ long in the centre.

The 3 ♂♂ before me, all NaOH-treated, are apterous, not brachypterous.

Sericothrips occipitalis Hood

1917 Bull. Brooklyn ent. Soc. vol. 12, pp. 32-34.

1952 Hartwig, Un. So. Afr. Ent. Mem. vol. 2, pp. 395-398, figs. 53, 56, 58-59.

This species was originally described from Nigeria and has since been recorded from many parts of Africa, especially on cultivated beans. Four females were collected by Dr. Thornton on papyrus at Rejaf in the Sudan during January 1955.

Edissa flava Faure.

1953 J. ent. Soc. S. Afr. vol. 16, pp. 194-198, figs. 1-4.

This species was recorded from Pretoria on kikuyu grass. Dr. Thornton found four females on papyrus at Rejaf in the Sudan, January 1955.

Suborder **TUBULIFERA**Family **PHLAEOTHIRIPIDAE****Haplothrips avenae** Priesner (Figs. 7—9).

1950 Bull. Soc. Fouad Ier Entom. Vol. 34, pp. 78-79.

This species was based on one female and one male, taken on oats at Zomba Nyasaland, in 1931. The large series of specimens taken on papyrus in the Sudan by Dr. Thornton agrees fairly well with Priesner's description, but it is possible that a comparison of this material with the types may show that the Sudan form is different. Meanwhile I am identifying it as *avenae*. In order to supplement the original description, I am giving further details, and figures.

Female (macropterous). Length (distended) 1.2—1.8 mm. *Colour*: body brown to blackish brown, eyes and ocellar crescents so deep red as to appear black; antennae: i, vii and viii brown, ii brown but slightly paler in apical third, iii yellow to greyish yellow, iv and v grey to pale yellowish brown, iv sometimes paler, almost yellow, in basal third, vi sometimes as brown as vii and viii, in other cases almost as pale as v, yellowish brown; wings hyaline, except scale of fore-wing which is grey and an irregular pale grey patch between scale and first sub-basal seta; legs brown, trochanters slightly paler, fore tibiae yellow in about apical fourth and on inner side, rest brownish yellow, but paler and darker parts merging into one another imperceptibly, sometimes fore-tibiae almost wholly yellow, sometimes nearly wholly greyish brown; all tarsi, except their cups, yellow, the middle and hind pair shaded with grey in some specimens; major setae yellow to pale grey, wing fringes and terminal tube setae grey, sigmoids on abdomen brown; internal pigment bright red.

Sculpturing not prominent but distinctly visible on specimens macerated in NaOH; integument throughout with a minutely alveolar or granulate structure; head from eyes to base with about 20 transverse anastomosing lines, which extend across dorsal aspect and sides and as far as inner margins of eyes on ventral side, giving the cheeks minutely serrate edges; pronotum slightly roughened by irregular ridges in median area and towards anterior angles of disc, and also bearing transverse lines like those on head, tending to form reticles in area between the epimera; mesonotum with transverse lines forming elongate reticles; median triangular area of metanotum with longitudinal reticles; median plate of tergite i reticulate; tergites ii-vii with transverse lines, which form irregular elongate and sometimes sub-quadrate reticles, these lines more prominent and some of them minutely asperate in cephalic half to two-thirds of the sclerites; the lines on tergites viii and ix less distinct; lines present on sternites ii-viii also but less distinct than on tergites and not asperate; tube with about six lines forming scallop-like cells above and below in about basal third; femora and tibiae with transverse lines, and antennae with feint lines, these not shown on the figures.

Head 1.1—1.3 as long as wide, 1.4 as long as pronotum, and 1.8—2.2 as long as the tube; width of head across eyes only about 1 to 8 μ less than the greatest width, which is across the middle of the cheeks; cheeks practically parallel and only slightly constricted at base; head not produced in front of eyes; head cylindrical, not flattened above or below. *Eyes* large, not bulging, finely faceted, dorsal and ventral lengths about equal. *Ocelli* borne on a slightly raised hump, anterior directed forward, posterior pair directed slightly laterad, their posterior margins slightly in front of a transverse line through middle of eyes, their lateral margins contiguous with inner margins of eyes. *Head setae*: postoculars short, expanded at apex, situated close to eyes and to lateral margins of head; other dorsal setae small, as illustrated; ventrally there is a fairly prominent pair at base of antennae, then 3 pairs of shorter setae at margins of eyes, a long pair at inner posterior angles of eyes, about six pairs of shorter ones behind eyes, in a line curving outwards and down to mouth cone, and medially about five pairs in two irregular lines, one or two of these pairs about 30 μ from labrum longest of this group and about equal to those at base of antennae.

Mouth-cone short, broadly rounded at apex; the maxillary bristles in retracted position do not reach level of postocular setae and form a very broad V, as indicated on the figure of the head and prothorax.

Antennae as illustrated; viii broadly joined to vii but narrower at base than vii is at apex; viii with a very slight indication of a notch at base, vii with a very short but distinct pedicel not shown on drawing; sense-cone formula: iii, 0—1; iv, 2—2; v, 1—1(+1); vi, 1—1(+1); vii, 1 dorsal.

Pronotum short, its length 0.5 of the width including coxae, anterior margin not thickened, median apodeme weak, visible in about second fourth from anterior margin only; epimeral sutures complete; all major setae present, rather short, all expanded at apex except the anterior marginals which are thin, pointed and short; on disc there are one or two pairs of small setae about 30 μ from anterior margin and about 70 μ apart, a pair more or less in line with the midlaterals and about 15 μ from them, and a pair between

Explanation of figures.

Haplothrips avenae Priesner

Fig. 7—♀, head and prothorax

8—♀, right antenna

9—♂, pseudovirga

Haplothrips tolerabilis Priesner

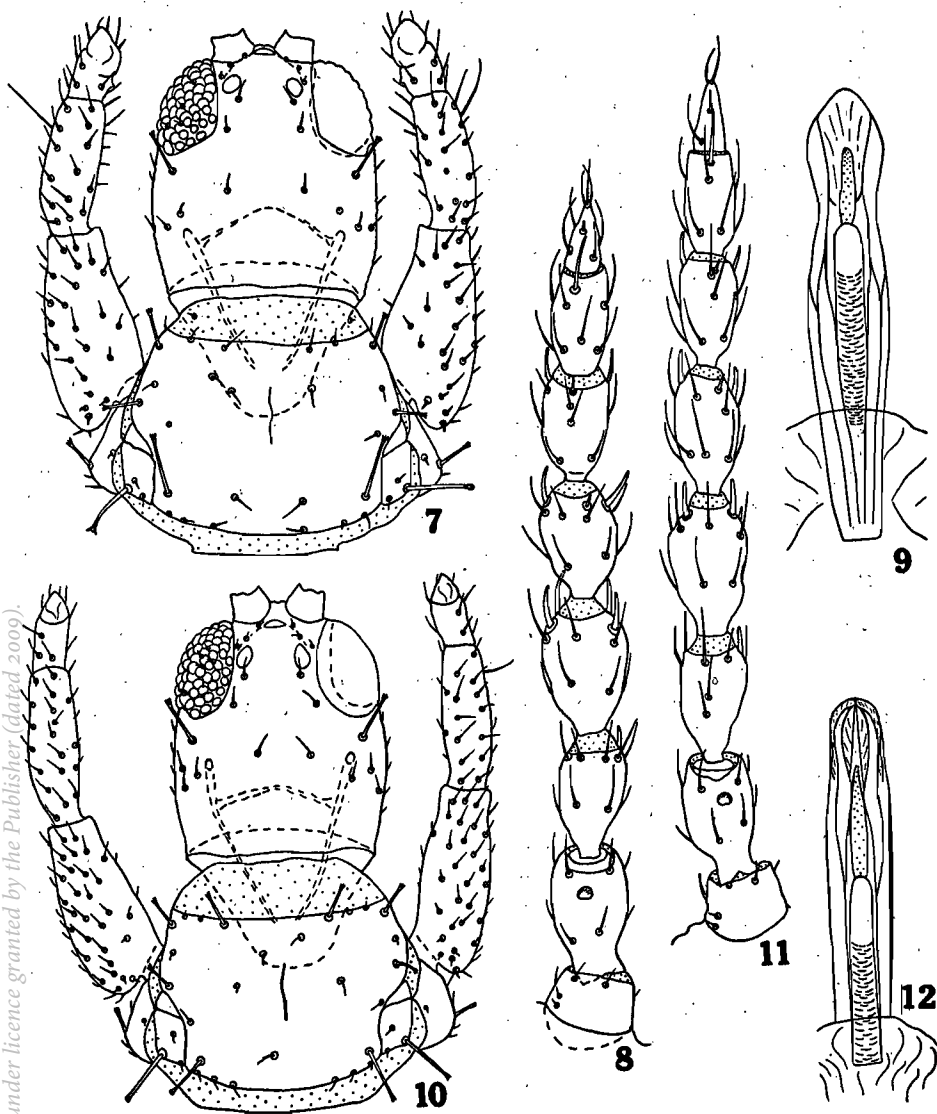
Fig. 10—♀, head and prothorax

11—♂, right antenna

12—♂, pseudovirga

(The pair of figures 7 and 10, as well as 8 and 11, drawn to the same scale)

Figs. 7-12: Mrs. M. Meyer del. (Projection apparatus).



midlaterals and anteroangulars; Priesner states, in his description of *avenae*: "disc with one pair of micro-setae behind fore margin"; presumably he refers to the setae about 30 μ from anterior margin and about 70 μ apart; in this position I find one or two pairs in the series before me.

Mesonotum: in lateral angles a pair of expanded setae about 16–20 μ long, three pairs of pointed setae near posterior margin, and two pairs of prominent pores near anterior margin, which may bear exceedingly minute setae; *metanotum*: one pair pointed setae about 20 μ long at about anterior third.

Fore-wings narrow, width at middle about 8–12 μ less than width at first of the duplicated cilia; surface somewhat humped at the middle and generally very feebly roughened; subbasal setae almost in a straight line, a. and b. expanded at apex, c. much longer, pointed; duplicated cilia: out of 25 $\varnothing$ $\varnothing$ on which the duplicated hairs were counted, one had 4–4, one 6–8, one 7–7 and one 6–7, nine had 5–5, six 5–6 and six 6–6; the usual number is therefore 5 to 6 and the extremes of the range 4 to 8.

Legs normal, fore femora only slightly enlarged; a few of the females before me have the fore femora relatively short and broad, more so than indicated by the ranges in the paragraph "measurements" below, L. of ff. about 110–114, W. about 64–66 μ ; fore tarsus usually bears a minute tooth towards its apex.

Abdomen: median plate of tergite i sub-triangular, in some cases rather irregular in shape, its length about 64–78, its width at base about 76–85 μ ; tube very short, its length 1.7–1.8 its own width at base, sides more or less parallel in about basal fifth, thence sloping evenly to apex; setae: sigmoids, 2 pairs each on ii–vii, the larger pair 32–44 μ long on ii–iii and vi–vii, about 60 μ long on iv and v; S. 2 knobbed, increasing in length caudad, 40–64 μ ; S. 3 knobbed, 32 μ on iii, up to 44 μ on vi; S. 3 of vii pointed, about 74 μ ; on viii two pairs blunt, S. 1 about 32–42, S. 2 about 54–64 μ long; on ix counting large setae only, S. 1 blunt, S. 2 and 3 pointed; on sternites ii–viii a row of 3 to 6 pairs of accessory pointed setae about 10–15 μ long and two pairs on hind margin about 15–30 μ in length; sternite viii strongly produced, about 90 μ long on a $\varnothing$ on which tergite viii measures 70 μ .

The pores and microsetae on the disc of tergites vii and viii are of the *H. aculeatus* type, as defined by Priesner (1936, Bull. Soc. roy. entom. d'Egypte p. 62); in 69 $\varnothing$ $\varnothing$ I have found these characters constant, except that one pore is absent on vii in two cases.

Measurements of one female (Jonglei, Sudd Region, Sudan, June 1954) in μ , followed in parentheses by the ranges of this plus two other females, NaOH-treated (Rejaf, January 1955); these three females were selected so as to include representatives of the largest and smallest individuals available. Length (distended) 1800(1155—); head L. 190(136—), W. across eyes 150(124–154), least W. at basal collar 140(116—), greatest W. across cheeks 152(132—); eyes: dorsal L. 72(48—), ventral L. ?(56–59), dorsal W.

48(32—), interval 52(—56), ventral W. ?(36—41), interval ?(56—59); ocelli: anterior-posterior ?(19—21), interval of posterior pair ?(28—32), diameters longit./transv. anterior 8(4—)/12(—13), posterior 16(12—)/12(11—13); head setae: ante-ocellars ?(6), post-ocellars ?(9—13), postoculars ?(24—40), their interval 122(108—), distance from eyes 12(8—); ventrally, pair near antennae ?(17—25), interval ?(17—25), pair at inner posterior angle of eyes ?(25—34), interval ?(51—64), longest pair near labrum ?(17—21), interval ?(25—38), distance from labrum ?(30—34); mouth-cone L. from posterior dorsal margin of head 56(—72), palpi: L./W. maxillary segment ii: ?(21—25)/?(6), terminal setae ?(17—21), labial ?(4)/?(4), terminal setae ?(9—13); labial setae ?(17—21); pronotum L. 134(96—), W. including coxae 256(200—), W. excluding coxae 205(176—), its setae: am. ?(9), aa. 12(—25), ml. ?(12—21), cx. 16(—20), em 46(32—), pm. 24—28(24—28); mesothorax W. 248(196—); metathorax W. 260(208—); fore-wings L. 675(525—), W. at first fringe-hairs 72(56—), W. at middle 42(30—), W. at first duplicated cilia 54(40—), fringe L. anterior 260(220—), posterior 320(220—), sub-basal setae a. 22(16—), b. 24(16—), c. 44(28—47), intervals a-b 20(16—25), b-c 18(10—); legs L./W. ff. 138(104—)/56(44—), ft. 92(76—)/38(30—), fta. 52(48—)/28(23—); hf. 168(128—)/48(42—), ht. 146(108—)/34(32—), its apical spurs 25—30(25—30), hta. 70(60—)/26(22—), abdomen L. 1110(645—), W. 244(208—), tube (segment x only) L. 88(76—), W. base 52(44—), least W. apex 30(25—); pores on disc tergite vii interval 21(6—), viii interval 59(42—64); setae viii: S.1. L. 32(—42), S.2. L. 54(—64); tergite ix: S.1. L. 56(48—64), S.2. L. 64(—72), S.3. L. 82(60—); apical tube setae 122(100—).

Antennae: total L. 287(232—).

Segm.	L.	W.	Segm.	L.	W.
i	28(21—),	28(24—) ;	v	40(32—),	24(23—).
ii	36(32—),	24(22—25);	vi	36(28—),	22(20—).
iii	36(28—),	24(22—) ;	vii	32(24—),	18(—19).
iv	42(32—),	30(26—) ;	viii	22(20—),	12(11—).

Male (macropterous). Length (distended) 1.2—1.3 mm. Colour identical with that of female, except that seta 2 on tergite ix (a sharp spine-like, thick seta) is as dark as the sigmoids. Structure and sculpture like those of female, with the following differences: most of the males are slightly smaller than the females; the 42 ♂♂ mounted in balsam can be roughly grouped as follows: maximum oedymorous 1, intermediate oedymorous 27, gynaeoid 14, although the line of demarcation between the second and third groups is not very clearly defined.

Sternite viii approximately equal in length to its tergite. On tergite ix the second large seta, at postero-lateral angles, is thick and sharp, spine-like, about 28 μ long.

Pseudovirga of the phallus as illustrated; its structure apparently agrees with Priesner's description. I have 24 ♂♂ of which the pseudovirgae are

measurable, 21 of them mounted under separated cover glasses; the other 3 not extruded but visible through the body wall; of the 21 mounted separately 4 are perhaps not completely normal, being slightly tilted or not quite fully distended. They were measured across the widest part of the apical "head" (W. at A) and across the widest part of the shaft (W. at B), with the following results W.A.: 8 μ , W.B.: 8 μ in 17 ♂♂; W.A. 7 μ , W.B. 7 μ in one ♂; W.A. one μ less than W.B. in 6 ♂♂. It is therefore evident that the pseudovirgæ are remarkably constant, both in the measurements given and in the shape of the sub-apical constriction, in spite of the variations in other measurements shown in the paragraph "measurements" below.

Fore-tarsal tooth always present, very small in gynaeccoids, larger and sharply pointed in oedymorous forms.

Measurements of one male (NaOH-treated, maximum oedymorous, Rejaf, Sudan, January 1955) in μ , followed in parentheses by the ranges of this plus three other ♂♂, one of these NaOH-treated, two intermediate oedymorous, one gynaeccoid, all from Rejaf, January 1955: Length (distended) 1300(1215—); head L. 160(144—), W. across eyes 136(122—138), least W. at base 124(106—), greatest W. across cheeks 140(124—); eyes: dorsal L. 60(—64), ventral L. 56(—60), dorsal W. 42(34—), interval 56(50—), ventral W. 34—40(32—), interval 64(56—); ocelli: anterior-posterior 20, interval of posterior pair 30(24—), diameters, longit./transv. anterior 4/12, posterior 12—14(12—14)/10—12(8—); head setae: postoculars 28—30(16—), their interval 108(96—), distance from eyes 8(8); mouth-cone L. from posterior dorsal margin of head 64(52—68); pronotum L. 120(92—), W. including coxae 220(180—), setae: aa. 20(12—), ml. 20(12—), cx. 20(12—), ep. 32(24—), pm. 32(20—); mesothorax W. 252(184—), metathorax W. 252(180—); forewings L. 560(539—), W. across scale 56(40—), W. at first fringe hairs ?(40—64), W. at middle 36(36), W. at first duplicated cilia 44(44), fringe L. anterior 224(200—), posterior 260(180—); sub-basal setae a. 22(18—), b. 22(16—), c. 44(32—), intervals a-b 22(16—), b-c 12(8—); legs L./W. ff. 140(104—)/72(40—), ft. 88(72—)/36(30—), fta. 52(44—)/28(22—), its tooth 10(4—)/16(6—), hf. 140(120—)/44(36—), ht. 120(100—)/32(28—), hta. 68(48—)/24(20—); abdomen L. 525(—742), W. 204(164—), tube (segment x only) L. 91(68—), W. base 46(42—), least W. apex 28(26—); setae tergite ix: S.1. L. 66—78(58—), S.2. L. 28(28), S.3. L. 88(80—); apical tube setae 124(100—).

Antennae: total L. 268(240—).

Segm.	L.	W.	Segm.	L.	W.
i	24(20—),	24(22—);	v	36(32—),	22(20—).
ii	36(32—),	24(22—);	vi	36(32—),	20(20).
iii	34(28—),	22(20—);	vii	32(28—),	18(16—).
iv	40(36—),	26(24—);	viii	22(20—),	12(12).

Material studied: 76 ♀♀ and 45 ♂♂, mounted on slides in Canada balsam,

collected by Dr. I. W. B. Thornton on papyrus in the Sudan: at Jonglei, Sudd Region, in June 1954, and Rejaf in January 1955.

This species is very similar to *Haplothrips tolerabilis* Priesner, discussed below. The two important distinguishing characters are (1) that *avenae* has the am. setae of the pronotum much thinner, pointed and usually shorter than the aa. setae, whereas am. and aa. are approximately equal in *tolerabilis*, and (2) that the pseudovirgae of the male genitalia differ as shown in the accompanying figures.

Haplothrips tolerabilis Priesner (Figs 10—12).

1936 Bull. Soc. roy. ent. d'Egypte, pp. 96-97.

1950 Bull. Soc. Fouad Ier Entom. vol. 34, p. 88, fig. 6.

This species was originally found on the grass *Cymbopogon nervatus* Chi. in the Sudan, and later recorded on cereal crops from Libya and Arabia. Dr. Thornton collected it on papyrus in the Sudan with *H. avenae*, but in smaller numbers.

The material before me agrees so well with Priesner's data, that I have very little hesitation in identifying it as *tolerabilis*. The two species are so similar in colour and structure, that there is no need to give a detailed description of *tolerabilis*; I am therefore merely noting the differences between them, and giving sets of measurements and drawings of *tolerabilis*.

H. tolerabilis differs from *avenae* in the two important characters mentioned above at the end of the description of the latter, and also as follows: in the series before me only 2 ♀♀ have a minute tooth on the fore tarsus, whereas a tooth is almost always present in *avenae*; the third sub-basal seta on the fore wings is blunt to slightly knobbed in *tolerabilis*, whereas it is more or less pointed (though not finely pointed) in *avenae*. The number of duplicated cilia in *tolerabilis* varies from 5 to 8, there being 6 in most cases.

Measurements of one female (Rejaf, January 1955) in μ , followed in parentheses by the ranges of this plus two other females, both NaOH-treated, one from Rejaf, January 1955, the other from Jonglei, June 1954; these three include the largest and smallest individuals available: Length 1800(1750—1830); head L. 190(164—), W. across eyes 152(148—), least W. at base 136(131—), greatest W. across cheeks 152(148—); eyes: dorsal L. 76(56—), ventral L. 68(64—72), dorsal W. 48(42—), interval 56(52—62), ventral W. ?(38—44), interval ?(64—68); ocelli: anterior-posterior 19(18—21), interval of posterior pair 32(28—), diameters longit./transv. anterior 4(—9)/13(—15), posterior 15(—17)/15(12—); head setae: ante-ocellars ?(6—9), post-ocellars ?(13—15), post-oculars 38(38), their interval 123(114—), distance from eyes 9(8—13); ventrally, pair near antennae ?(19—25), interval ?(17—21), pair at inner posterior angle of eyes ?(36—47), interval ?(51—59), longest pair near labrum ?(30—36), interval ?(25—30), distance from labrum ?(30—34); mouth-cone L. from posterior dorsal margin of head

71(—100), palpi: L./W. maxillary segment ii: ?(30)/?(6—9), terminal setae ?(25), labial ?(6—9)/?(4—6), terminal setae ?(13); labial setae ?(30); pronotum L. 120(115—), W. including coxae 233(226—258), its setae: am. 20(—21) aa. 30(24—), ml. 21(—30), cx. 13(—25), em. 42(—49), pm. 42(32—); mesothorax W. 250(236—); metathorax W. 250(236—); fore-wings L. 708(692—), W. at first fringe hairs 80(56—), W. across scale 59(48—), W. at middle 42(38), W. at first duplicated cilia 55(51—), fringe L. anterior 296(247—), posterior 331(282—), sub-basal setae a. 27(—34), b. 25(—30), c. 57(—64), intervals a-b. 21(20—), b-c. 13(10—15); legs L./W. ff 127(—141)/49(—60), ft. 113(112—)/34(—36), fta. 56(52—)/23(—26); hf. 176(—183)/49(—52), ht. 148(—164)/34(32—), its apical spurs 17(—30), hta. 64(—80)/25(24—); abdomen L. 1185(—1200), W. 250(240—264), tube (segment x only) L. 92(89—), W. base 52(—56), least W. apex 31(30—); pores on disc tergite vii interval 11(—21), viii interval 51(42—); tergite ix: S.1. L. 64(62—72), S.2. L. 97(88—), S.3. L. 85(—92); apical tube setae 138(106—).

Antennae: total L. 296(292—304).

Segm.	L.	W.	Segm.	L.	W.
i	23(21—28),	32(27—);	v	42(42)	25(24—).
ii	38(—40)	25(—26);	vi	36(—38)	21(—24).
iii	40(38—)	23(—25);	vii	32(—36)	19(—21).
iv	47(44—)	30(28—);	viii	23(21—24),	11(—13).

There are no strongly oedymorous individuals amongst the males of *tolerabilis* before me, and also no exceptionally small individuals. I regard those with the larger fore femora as intermediate-oedymorous, and those with the smaller fore femora as gynaeoid. The fore-tarsal teeth are much weaker than those of *avenae*; even the gynaeoids of the latter have the teeth about $4\ \mu$ long, whereas the longest teeth found in *tolerabilis* are only about $2\ \mu$ long.

The pseudovirgae of the genitalia have been mounted separately in 5 of the ♂♂ of *H. tolerabilis* before me, and they all agree fairly closely with that shown on the figure, but it is perhaps somewhat doubtful whether they agree fully with Priesner's figure. Measurements of the pseudovirgae of my 5 ♂♂ show that the apical head is about $1\text{--}2\ \mu$ narrower than the shaft in three, and equal to the shaft in width in the two others. If these pseudovirgae are typical of *tolerabilis*, they provide a good character for distinguishing between this species and *avenae*.

Measurements of one male (Rejaf, January 1955), intermediate-oedymorous, NaOH-treated, in μ , followed in parentheses by the ranges of this plus two other males, also Rejaf, January 1955, one intermediate, the other gynaeoid, NaOH-treated: Length (distended) 1277(—1462); head L. 165(152—176), W. across eyes 136(—144), W. across cheeks 136(—140), least W. at base 116(—119); eyes: dorsal L. 64(—68), ventral L. 59(—64), dorsal W. 38—42(—43), interval 56(—57), ventral W. 38—42(38—42), interval 57(—64);

ocelli: anterior-posterior 19(17—), interval of posterior pair 27(—30), diameters longit./transv. anterior 6(6)/13(—15), posterior 15(13—)/13(11—); head setae: post-ocellars 13(13), post-oculars 27(—38), their interval 106(—108), distance from eyes 9(9); ventrally, pair near antennae 21(20—), interval 15(—19), pair at inner posterior angle of eyes 38(34—42), interval 42(—55), longest pair near labrum 34(30—), interval 25(21—), distance from labrum 30(25—); mouth-cone, L. from posterior dorsal margin of head 67(55—68), palpi: L./W. maxillary segment i: 4(4)/9(9), ii: 25(25)/6(6), terminal setae 17(—25), labial palpi 6(—9)/6(4—), terminal setae 9(—11); labial setae 21(21); pronotum L. 101(—108), W. including coxae 190(—199), its setae: am. 21(17—), aa. 21(17—23), ml. 23(13—25), cx. 21(17—), ep. 34(32—), pm. 27(25—30); mesothorax W. 205(197—), metathorax W. 200(197—212); fore-wings L. 569(539—615), W. at first fringe hairs 61(59—64), W. across scale 49(47—51), W. at middle 34(30—38), W. at first duplicated cilia 47(42—49), fringe L. anterior 226(212—247), posterior 261(254—353), sub-basal setae a. 19(—21), b. 19(—25), c. 42(—47), intervals a - b. 19(—21), b - c. 11(9—); legs, L./W. ff. 134(123—)/59(42—), ft. 106(89—)/34(32—), fta. 49(44—51)/23(23), its tooth 2(2); hf. 155(141—)/42(38—), ht. 130(116—134)/30(—32), its apical spurs 30(25—), hta. 64(55—71)/23(21—); abdomen L. 800(—892), W. 186(169—190), tube (segment x only) L. 87(85—89), W. base 47(47), least W. apex 30(27—); pores on disc tergite vii interval 9(—13), viii interval 30(23—); tergite ix: S.1. L. 68—76(68—76), S.2. L. 30(27—34), W. 2, S.3. L. 110(101—123); apical tube setae ?(106).

Antennae: total L. 275(254—285).

Segm.	L.	W.	Segm.	L.	W.
i	21(17—)	25(—30);	v	38(34—40),	21(—23).
ii	34(30—)	23(—25);	vi	38(32—)	21(21)
iii	34(32—36),	21(21) ;	vii	34(30—)	19(17—).
iv	42(34—)	25(25) ;	viii	21(21)	13(11—).

Material studied: 39 ♀♀ and 21 ♂♂ mounted on slides in Canada balsam, collected by Dr. I. W. B. Thornton on papyrus in the Sudan: Jonglei, Sudd, June 1954, 7 ♀♀, 3 ♂♂, Zeraf Cuts, January 1955, 1 ♂; Rejaf, January 1955, 32 ♀♀, 17 ♂♂.

Chiraplothrips sp.

At Rejaf, Sudan, Dr. Thornton collected 13 ♀♀ and one ♂ of a species of *Chiraplothrips* Priesner 1930, on papyrus, in January 1955. Although the genitalia of the one male are extruded, the pseudovirga is not satisfactorily mounted. I shall therefore postpone identification of this species until more male specimens become available for study.